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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/826,472	04/04/2001	Bin Yu	0180197	6214
25700	7590	09/22/2004	EXAMINER	
FARJAMI & FARJAMI LLP 26522 LA ALAMEDA AVENUE, SUITE 360 MISSION VIEJO, CA 92691			POMPEY, RON EVERETT	
			ART UNIT	PAPER NUMBER
			2812	

DATE MAILED: 09/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 09/826,472	<b>Applicant(s)</b> YU, BIN	
	<b>Examiner</b> Ron E Pompey	<b>Art Unit</b> 2812	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 20 June 2004.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-3 and 5-19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 5-19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-3 and 5-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gardner et al. (US 5,963,810) and further in view of Dautartas et al. (US 6,124,158), Chen (US 5,994,192), admitted prior art (APA), Adetutu et al. (US 6,369,430) and Wurzer et al. (US 6,451,676).

Gardner discloses the limitations of:

For 1, 2, 5-6, 8, 9, 11, 12 and 14:

depositing a first nitride film (303, fig. 3A) on a semiconductor substrate;

depositing a high-k material (305, fig. 3B) on the first nitride (col. 5, lns. 30-64 and col. 3, lns. 25-32),

depositing a second nitride film on the high-k material (col. 6, lns. 13-20);

depositing a thick gate material on the second ultra-thin nitride film; and

completing fabrication of the device;

wherein the first and second ultra-thin nitride films prevent the at least one material selected from the group consisting essentially of zirconium (Zr), hafnium (Hf) and titanium (Ti) from diffusing into the semiconductor substrate and the thick gate material respectively (col. 6, lns. 1-12). It is inherent that the diffusion

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of the metal material will be prevented, because the structure of the gate dielectric (nitride/high k/nitride) of Gardner is the same as that of applicants claimed invention and therefore will perform the same.

3. Gardner does not disclose the claimed limitation(s) of, for claims 3, 7, 13 and 15-30:

wherein the nitride films are deposited by using an atomic layer deposition (ALD) technique.

However, Dautartas discloses the above claimed limitations in column 7, line(s) 15-30.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Dautartas with Gardner, because this deposition technique provides excellent uniformity and surface conformity of thin insulator films..

4. Gardner does not disclose the claimed limitation(s) of, for claims 10 and 18-19:

that using a photoresist is part of the etching processes.

However, Chen discloses the above claimed limitations in column 4, line(s) 14-34.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Chen with Gardner, because photoresist protects the area that is not being removed during formation of the gate structure and to supply applicant with further support for the *official notice* stated in the office action mailed 8-20-02.

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5. Gardner does not disclose the claimed limitation(s) of, for claim 1 and 12:

Wherein the thin metal film comprises at least one material selected from the group consisting essentially of zirconium (Zr), hafnium (Hf) and titanium (Ti). However, the admitted prior art discloses the above claimed limitations on page 2, line(s) 1-8.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine the admitted prior art with Gardner, because they are art recognized equivalent materials.

6. Gardner does not disclose the claimed limitation(s) of, for claims 2 and 12:

wherein the substrate comprises a silicon-on-insulator (SOI) wafer. However, Adetutu discloses the above claimed limitations in column 2, line(s) 25-27.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Adetutu with Gardner, because the SOI substrate reduces the body capacitance of a semiconductor device.

7. Gardner does not disclose the claimed limitation(s) of, for claims 1 and 12:

wherein the gate material comprises polysilicon-germanium (poly-SiGe). However, Wurzer discloses the forming a gate material comprising polysilicon-germanium in column 3, line(s) 32-44.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Wurzer with Gardner, because the percentage proportion of germanium in the polysilicon can set the threshold voltage of the device.

***Response to Arguments***

8. Applicant's arguments filed 7-13-04, pertaining to claims 1-3 and 5-19, have been fully considered but they are not persuasive. The applicant argues that Gardner fails to disclose forming a ultra thin nitride film by atomic layer deposition, a silicon-on-insulator (SOI) wafer, or depositing a gate material comprising polysilicon-germanium on an ultra-thin nitride film. The applicant discloses the limitation(s), per the rejection, that the prior art teaches and then further states that the prior arts don't teach the limitation(s) they are not relied upon in the rejection. However, the applicant does not argue that the combination of the additional prior arts, regarding the limitation(s) for which they are addressing in the rejection, is incorrect only that each individual prior art does not disclose all the deficient limitations of Gardner. This, different references disclosing particular limitations not shown by the main reference, is allowed within the scope of a 103 rejection as long as there is motivation to combine pertaining to the limitation it is addressing. Therefore, the examiner's rejection is upheld.

***Conclusion***

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is

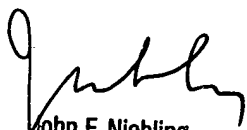
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filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ron E Pompey whose telephone number is (571) 272-1680. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Ron Pompey  
AU: 2812  
September 20, 2004

  
John F. Niebling  
Supervisory Patent Examiner  
Technology Center 2800